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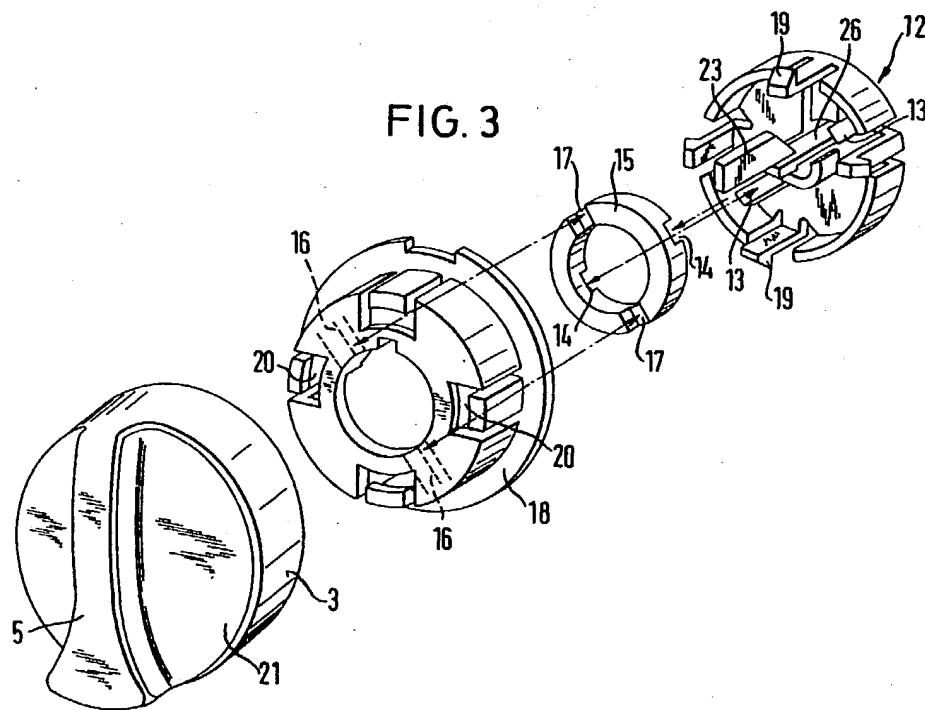
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(54) **Rotary knob**

(57) A rotary knob for a control device in a household appliance is arranged to be drivingly connected to a rotary actuating shaft of the device and to be

recessed in a circular opening in an operating panel or a front wall of the appliance housing so as to be rotatably mounted independently of the shaft. The knob comprises a hub member (12) engaging the actuating shaft, an annular Cardan coupling member (15) having transverse grooves (14, 17) displaced through 90° at both of its end faces, a cover member (18) receiving the hub member (12) and the coupling member (15) and axially detented by means 19, 20 with the hub member (12), and a cap (21) connected through a detent with the cover member (18). A rib (13) of the hub member (12) engages into one transverse groove (14) of the coupling member (15) and a rib (16) of the cover member (18) engages into the other transverse groove (17) of the coupling member to permit relative sliding movement of the hub member (12) and cover member (18) to allow for misalignment of the shaft and knob axes.

FIG. 3

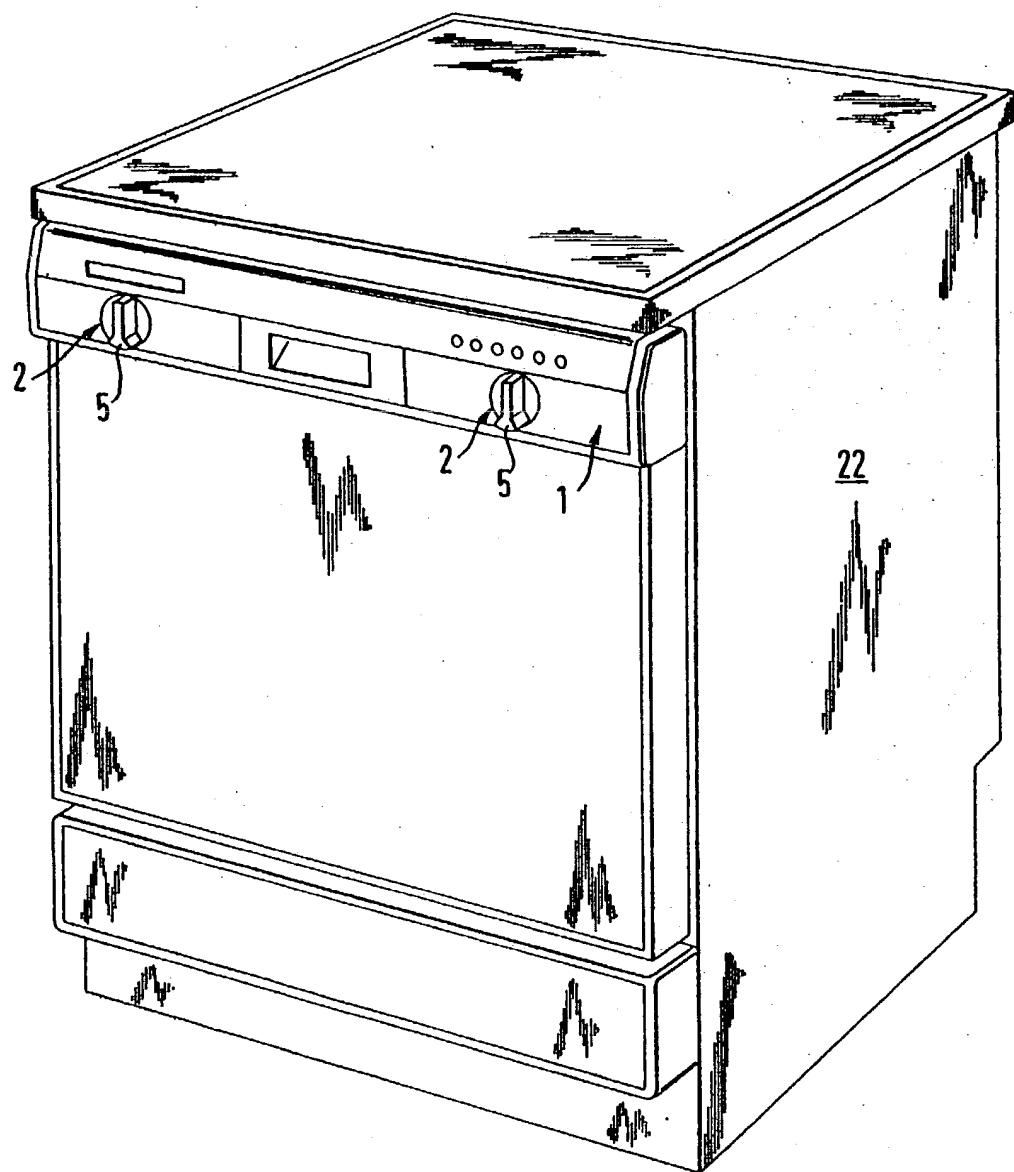


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FIG. 1



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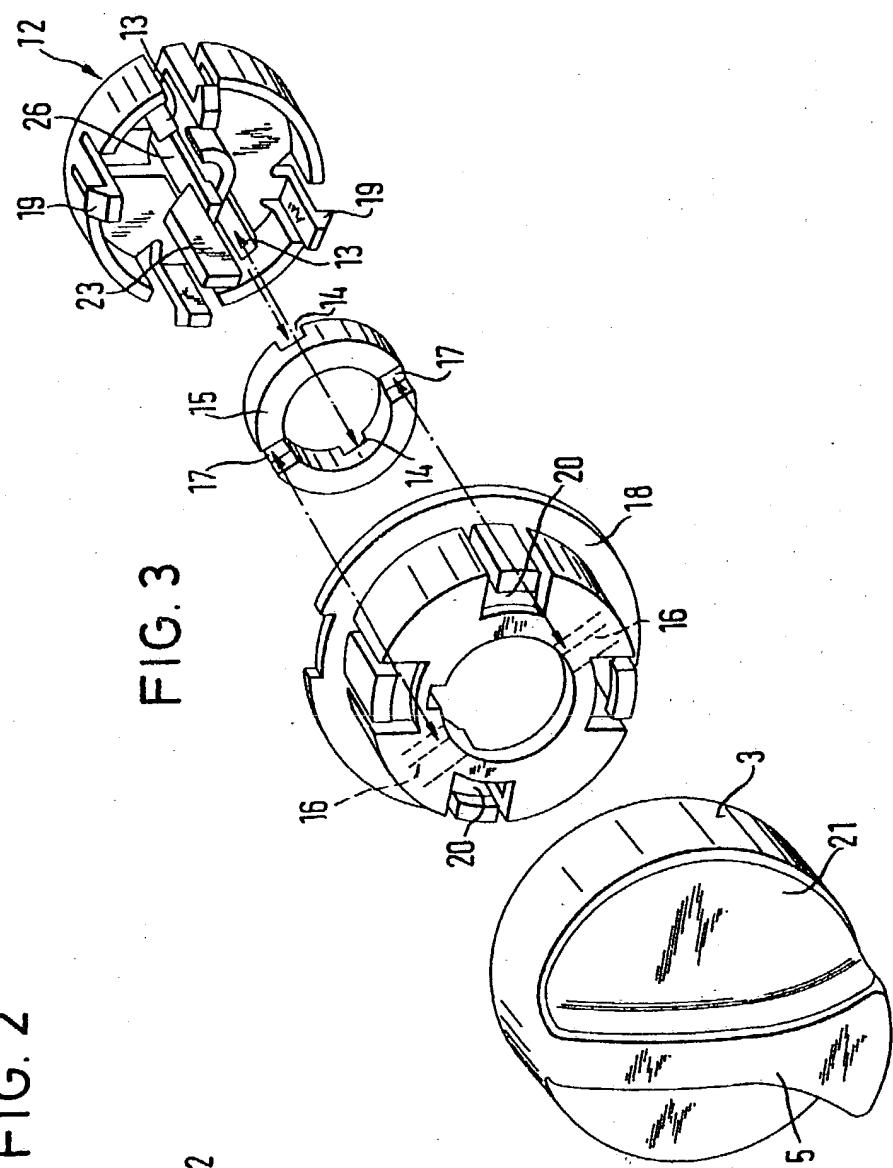


FIG. 2

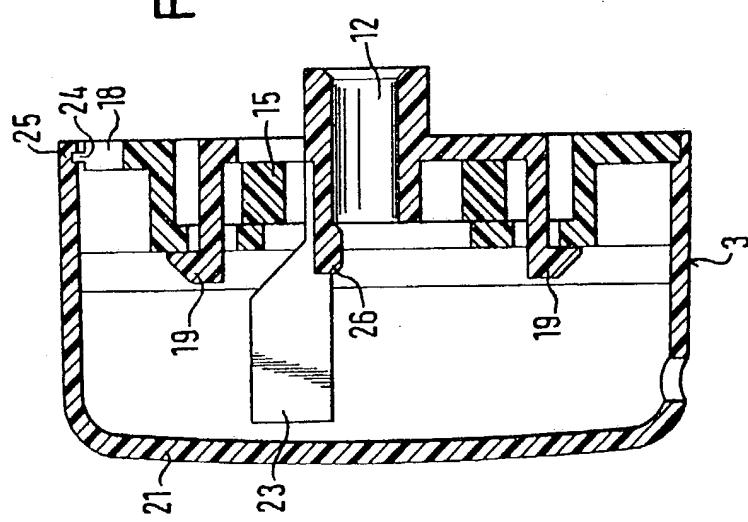
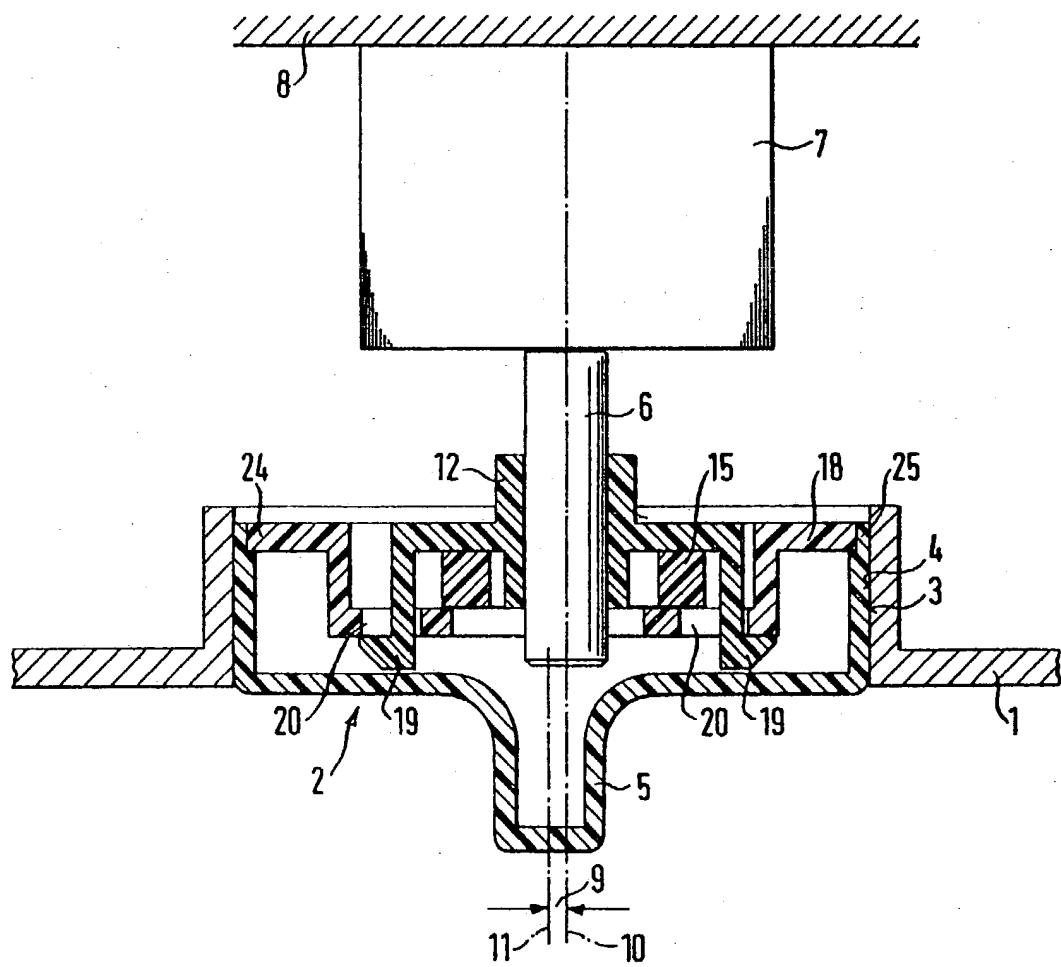
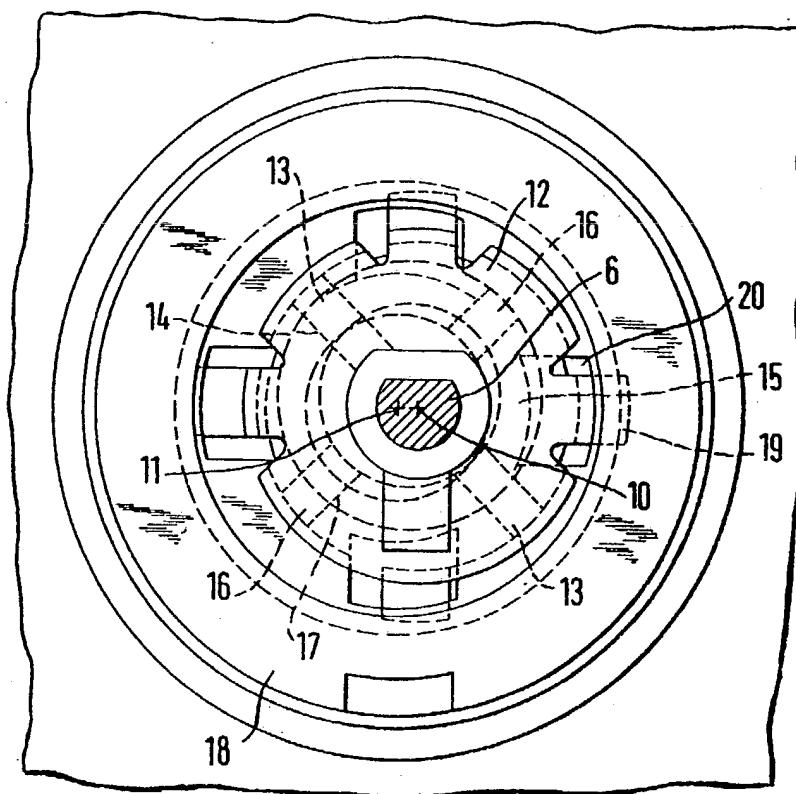


FIG. 4



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FIG. 5



SPECIFICATION**Rotary knob**

5 The present invention relates to a rotary knob, and has particular reference to a knob for a switching or other control device provided in a household appliance housing.

In household appliances, particularly dishwashing machines, washing machines, laundry driers and cookers, rotary knobs are provided for setting operational requirements, for program setting, for switching on and off, for actuation of indicators, and so forth, these knobs being plugged onto the actuating shafts of switching or other control devices mounted in the appliance housing behind operating panels, covers or doors.

In known rotary knobs of this kind, the actuating shaft due to production tolerances does not always extend exactly perpendicularly to the outside wall of the housing. In order to prevent the shaft from grazing the housing, the passage hole in the housing wall must be formed to be relatively large. This is disadvantageous since moisture and dirt can penetrate through the hole into the housing. Moreover, these production tolerances necessitate an increased spacing of the knob from the housing wall, which can have a disadvantageous effect on the overall impressions of the quality of the household appliance. In addition, the knobs guided only on the shaft are relatively unsteady.

There is therefore a need for a simply constructed, easily assembled and mounted rotary knob which can be arranged countersunk entirely or partially in, for example, an operating panel or housing wall and in that case, in spite of precise guidance in the panel, makes possible a tolerance equalisation between the axis of a shaft to be driven and the axis of the knob cap guided substantially free of play in the panel or wall.

According to the present invention there is provided a rotary knob for rotatable mounting in a surround and for rotary actuation of a shaft, the knob comprising a hub member provided with a passage for engagement therein of such shaft, a cover member receiving the hub member and connected thereto in the axial direction of the passage by detent means, a cap arranged on the cover member, and an annular coupling member arranged in the cover member and coupling the cover member to the hub member to be rotatable therewith, the coupling member being provided with two mutually perpendicular transverse grooves disposed one in each axial end face thereof and the hub and cover members each being provided with rib means slidably engaged in a respective one of the grooves to permit relative sliding movement of the hub member and the cover member with cap perpendicularly to the axial direction.

60 In a preferred embodiment, the knob is seated on a rotatably mounted actuating shaft and is arranged countersunk in a circularly shaped cut-out of an operating panel or front wall of the appliance housing so as to be rotatably mounted independently of the actuating shaft. The knob comprises a rotary

hub member plugged onto the actuating shaft of a control device, an annularly cylindrical Cardan coupling element having transverse grooves displaced through 90° at both of its end faces, a rotary cover member receiving the hub member and the coupling member and detented therewith and a rotary cap connected through a detent with the cover member. A rib of the hub member engages into one transverse groove of the coupling member and a rib of

70 the cover member engages into the other transverse groove of the coupling member.

In an advantageous construction, the hub member has integrally formed resilient detent hooks which engage behind recesses in the cover member and

75 carries a spring clip at a slotted hub portion at the actuating shaft.

Expediently, a crossbar forming a handle and a cylindrical shell surface, which is rotatably guided in a cylindrical receptacle of the operating panel, are 80 formed on the cap.

An embodiment of the present invention will now be more particularly described by way of example with reference to the accompanying drawings, in which:

90 *Figure 1* is a perspective view of the housing of a household dishwashing machine with two rotary knobs, each embodying the invention, inserted into an operating panel of the machine;

Figure 2 is a cross-section of one of the rotary knobs of *Figure 1*;

Figure 3 is an exploded perspective view of the knob of *Figure 2*;

Figure 4 is a cross-section of the knob, at right angles to the section shown in *Figure 2*, arranged in 100 the operating panel; and

Figure 5 is a rear view of the knob.

Referring now to the drawings, rotary knobs 2 are mounted in countersunk arrangement in an operating panel 1 fastened to a front door of a housing 22

105 of a dishwashing machine. In that case, a shell surface 3 of the knob 2 is rotatably guided in a cylindrical receptacle 4 of the panel and the rotary knob is countersunk to such an extent that only a cross-bar 5, which forms a handle and is provided on 110 a cap 21 of the knob, projects out from the front side of the panel.

A switching or other control device 7, which is fastened behind the operating panel to a frame 8 of the housing 22 by, for example, screws (not shown)

115 is actuatable by means of the rotary knob 2 engaging an actuating shaft 6 of the device, the shaft being flattened off at its free end. Due to production tolerances, it is possible that the axis 10 of the shaft 6 and the axis 11 of the knob 2 are displaced by, for

120 example, an amount 9 (*Figure 4*). To compensate for this displacement, the knob 2 possesses a Cardan coupling member 15 arranged between a hub member 12 and a cover member 18. The coupling member 15 consists of a cylindrical ring which is

125 provided in its end faces with transverse grooves 14 and 17, respectively, wherein the grooves are displaced through 90° relative to each other and arranged in parallel planes perpendicular to the shaft. A rib 13 is formed on the hub member 12 and

130 engages in the groove 14, whilst a rib 16 is formed

on the cover member 18 and engages in the groove 17.

For the connection of the hub member 12 with the cover member 18, the latter is provided with recesses 20, into which resilient detent hooks 19 of the hub member are pressed, although relative displacement of these parts remains possible for the equalisation of the displacement amount 9. Formed on a slotted hub portion 26 of the hub member 12 is a 10 spring clip 23, which during assembly retains the coupling member inserted into the hub member and, when the knob is assembled, contributes to play-free seating of the actuating shaft in the hub member. The connection of the cap 21 with the cover 15 member 18 is effected by detent or snap elements 24 and 25 between these parts.

CLAIMS

- 20 1. A rotary knob for rotatable mounting in a surround and for rotary actuation of a shaft, the knob comprising a hub member provided with a passage for engagement therein of such shaft, a cover member receiving the hub member and connected thereto in the axial direction of the passage by detent means, a cap arranged on the cover member, and an annular coupling member arranged in the cover member and coupling the cover member to the hub member to be rotatable therewith, the coupling 25 member being provided with two mutually perpendicular transverse grooves disposed one in each axial end face thereof and the hub and cover members each being provided with rib means slidably engaged in a respective one of the grooves to permit 30 relative sliding movement of the hub member and the cover member with cap perpendicularly to the axial direction.
2. A knob as claimed in claim 1, the detent means comprising resilient hook elements arranged on the 35 hub member and engageable in recesses in the cover member.
3. A knob as claimed in either claim 1 or claim 2, wherein the passage is defined by a slotted portion of the hub member, the slotted portion being 40 provided with a spring clip.
4. A knob as claimed in any one of the preceding claims, wherein the cap is provided with a cylindrical circumferential surface for rotary engagement in a cylindrical opening in such surround and with a 45 transverse projection defining a grip for turning the knob.
5. A knob substantially as hereinbefore described with reference to the accompanying drawings.
- 55 6. A household appliance comprising a housing, a control device operable by a rotary shaft, and a rotary knob as claimed in any one of the preceding claims, the shaft being non-rotatably engaged in the passage of the hub member of the knob and the 60 knob being rotatably mounted in a circular opening in a portion of the housing.
7. An appliance as claimed in claim 6, the housing portion being an operating panel of the appliance.
- 65 8. A household appliance substantially as

hereinbefore described with reference to the accompanying drawings.

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